USER - MANUAL	**Control Card for pumps/motors - SVP**	
	Manual code :P35160013E	Revision:1

1. Product coding table.

SVP	Proportional amplifier for control of pumps / motors
X	X = for 0.88 A proportional Solenoids (24 V DC) (STANDARD) Y = for 1.76 A proportional Solenoids (12 V DC) Z = for 2.50 A proportional Solenoids (9 V DC)
I	I = with independent control of proportional outputs S = with symmetrical control of proportional outputs (STANDARD)
E	E = with general enabling control (STANDARD) K = with general enabling control and consensus for the proportional output 0 = without general enabling control
1	1 = with ± 5V voltage control signals (STANDARD) 2 = with ± 20mA current control signals
ST	ST = version with panel settings (STANDARD) CN = version with CAN communication interface (optional)
00	Versions 00 = no version (STANDARD)
D1	1 series digital model

The product is supplied complete with connector + connector facial sealing gasket + 30 contacts + 30 rubber seals for each wire.

2. Product description.

The SVP electronic current-feedback amplifier is designed to control a variable flow pump or two pumps on an open circuit, or two motors.
The amplifier has two current-feedback proportional outputs and one power output without current feedback.
Each proportional output is controlled by an analogue channel. It is, thus, possible to manage the two proportional outputs independently (the suffix I in the order code stands for independent control of the proportional outputs).
By selecting a switch on the card, both proportional outputs can be controlled with the same analogue control input (the suffix S in the order code stands for symmetrical control of the proportional outputs).
Symmetrical mode is used for pumps on a closed circuit with two-solenoid control. In independent control mode, the two proportional outputs are independent and two open circuit pumps with single solenoid control can be controlled WITH EACH OUTPUT. The card also has an output for control of the brake: this works when the two solenoids have minimum current: the output is disabled as soon as the current of one of the two solenoids passes the minimum current threshold.

3. Key Features

- The general external control for enabling the card can be activated or bypassed.
- Linear and independent, up- and down current ramps on the proportional outputs.
- Control of the card via potentiometer, voltage signal (± 5V) from an external source or current signal from an external source (± 20mA).
- Differential analogue control inputs.
- Adjustment of the current threshold for intervention of the control output of the Brake Relais.
- Adjustment of the control parameters on the digital panel on the card.
- Two digital outputs (0.5A power) for reporting card failure or malfunction
- Protection against short circuits on the current outputs.
- Protection against polarity inversion on the power supply.
- Protection against power supply over voltage.

4. Additional features.

- When ordering, it is possible to specify the version with general card enabling control (STANDARD) and separate consensus controls for the activation of the two proportional outputs (OPTIONAL).
- Third analogue input (± 5V or ± 20mA) for acquisition of pressure transducer, or position transducer (OPTIONAL).
- Digital input (12V or 24V) for frequency signals (encoder, or inductive proximity sensors) (OPTIONAL).
- CAN-bus data communication interface (OPTIONAL).

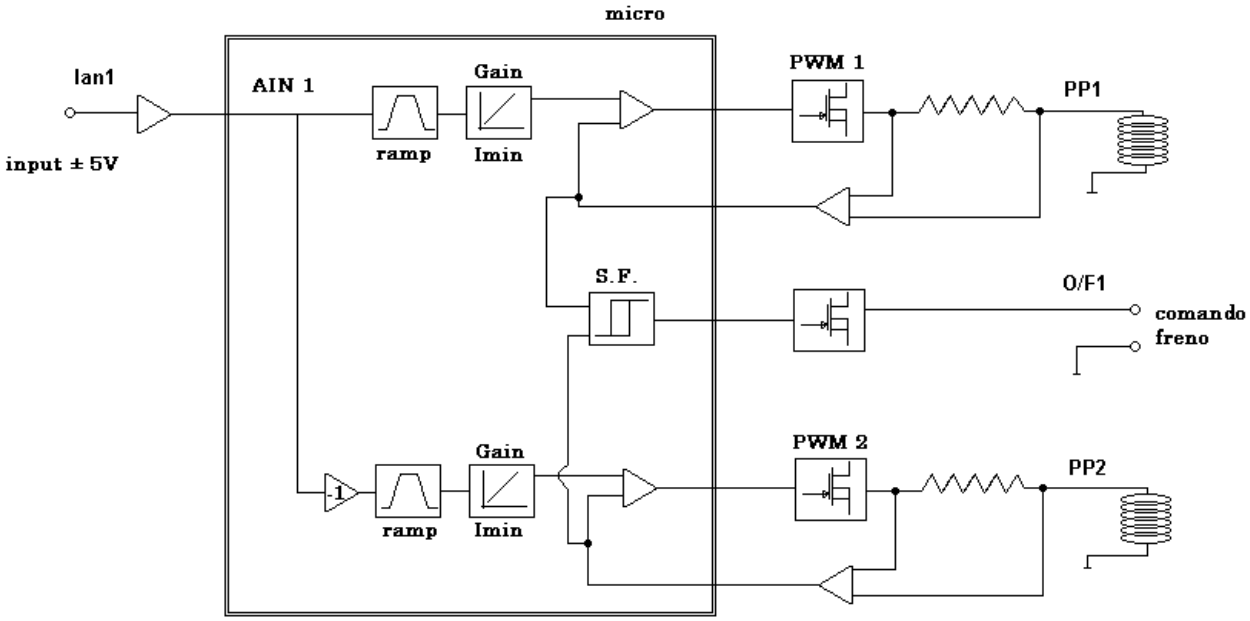
5. Specifications.

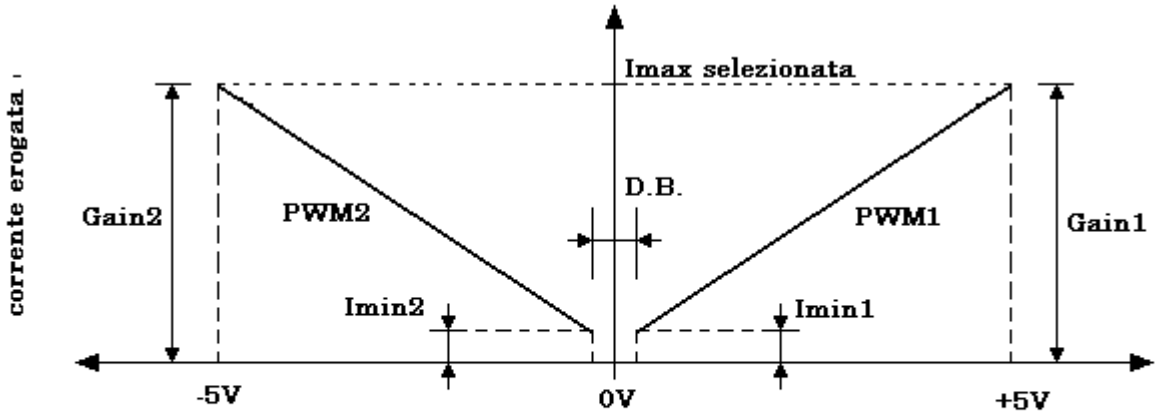
		NOTES
Supply voltage	10 ... 30V DC	Min 9V, Max 36V.
Maximum current consumption	8A	
Maximum output current for proportional channel	2.5A	
Maximum output current for control of brake	3.0A	
Analogue signal from external source for proportional controls	± 5V, or ± 20mA	
Potentiometer rating	2KΩ to 10 KΩ	
Adjustment of ramp up time	0s to 20s	
Adjustment of ramp down time	0s to 20s	
Adjustment of minimum current of proportional channels	0 to 50% of selected Imax	
Adjustment of current gain of proportional channels	50% to 100% of selected Imax	
Adjustment of brake release threshold	0 to 50% of selected Imax.	
Electrical connection	29-pin AMP connector	Connector and crimp contacts included (*)
Operating temperature	-40°C....+80°C	
Degree of protection	IP65	With connector fitted and cabled correctly (*)
EC compliance	EN 61000-6-1 EN 61000-6-3 EN ISO 14982	

(*) The customer is responsible for fitting and wiring the connector to the SVP proportional card.

6. Specification curves of the current outputs.

- Operation of the proportional outputs in alternating mode.





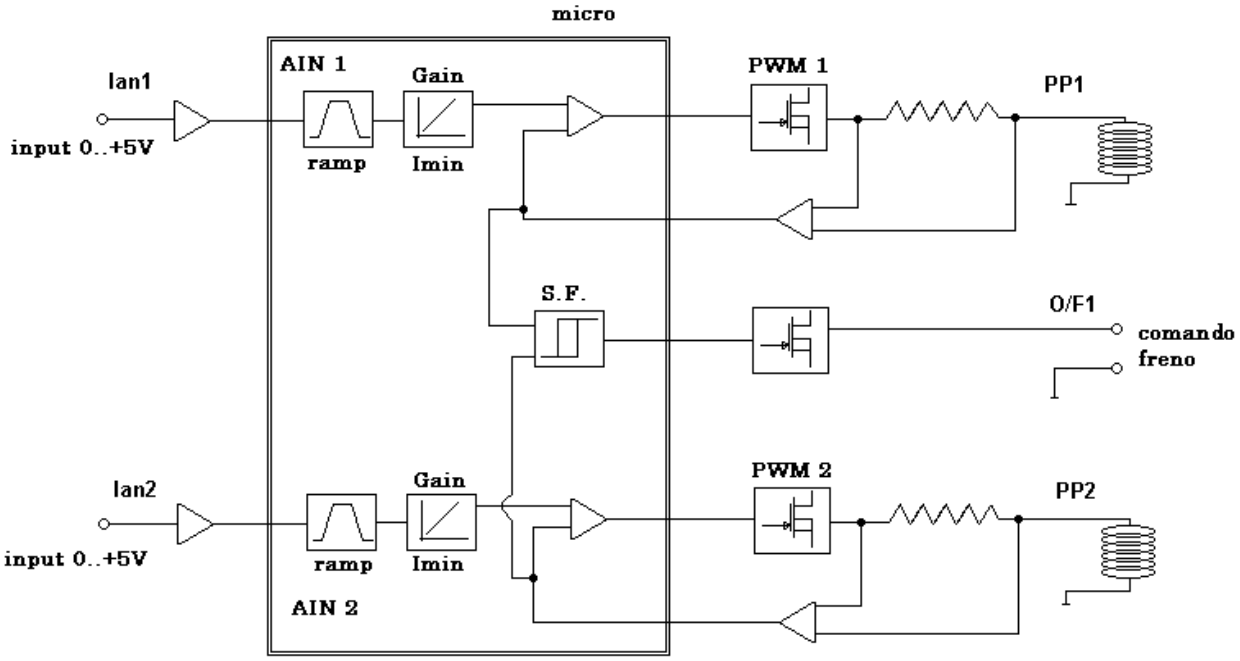
D.B. = banda morta
Imin = corrente minima di polarizzazione
Gain = guadagno di corrente

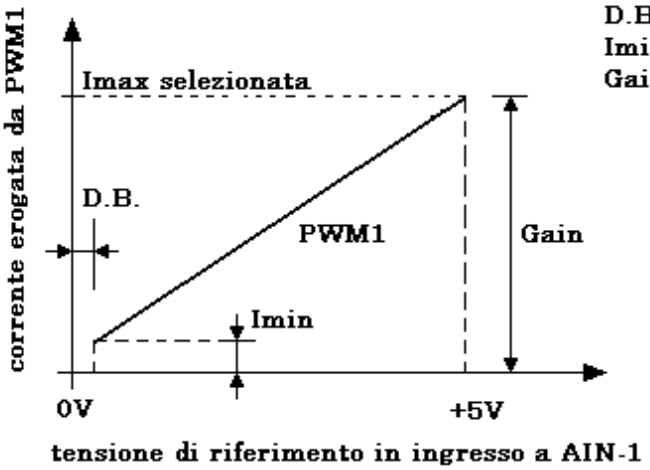
in this configuration, the control signal varies between -5V and +5V with 0V as the central value; the control signal must be on analogue input **Ian 1**.
Any control signals sent to the card's analogue input 2 will be ignored.

In symmetrical mode, when the reference signal is between 0V and –5V, proportional output PWM1 **(PP1)** is off but proportional output PWM2 **(PP2)** is on. When the reference signal is between 0V and +5V, proportional output PWM1 **(PP1)** is on but proportional output PWM2 **(PP2)** is off.

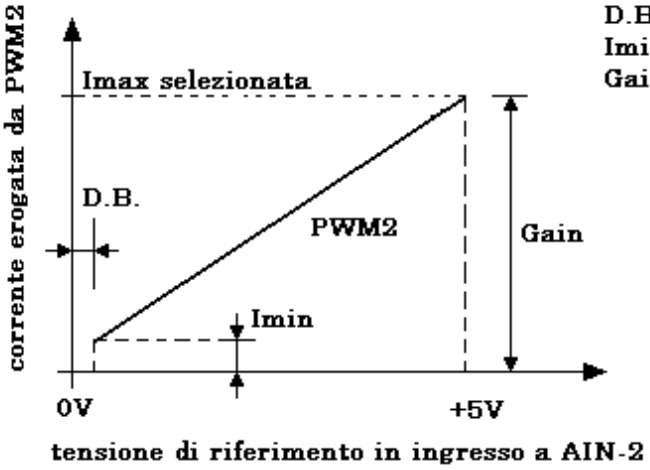
- Operation of the proportional outputs in independent mode.

In this mode, the two outputs work independently: proportional output PWM 1 **(PP1)** is controlled by the signal on analogue input **Ian 1,**
and proportional output PWM 2 **(PP2)** is controlled by the signal on analogue input **Ian 2.**





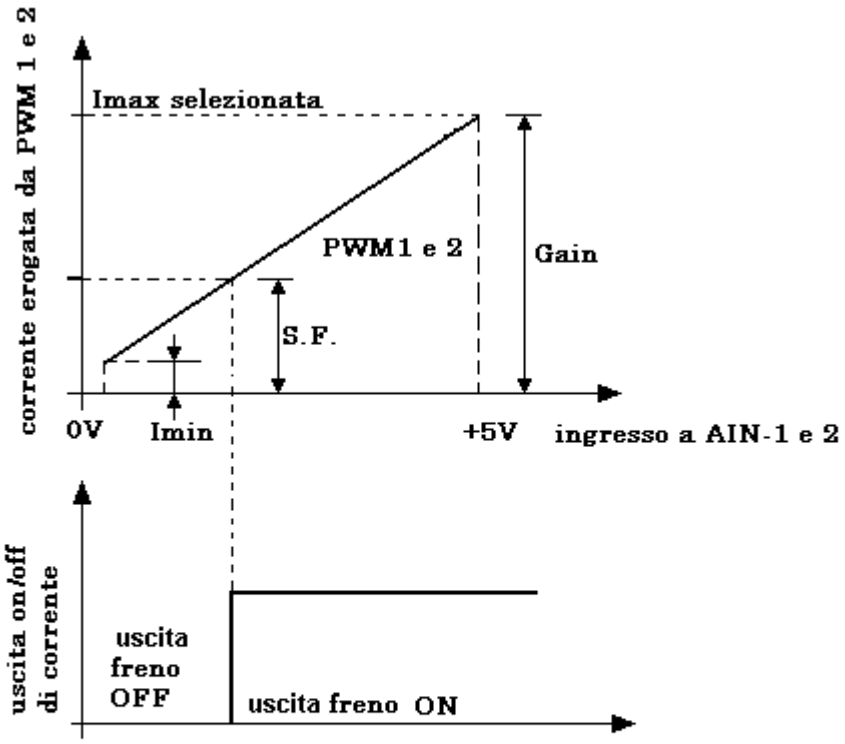
D.B. = banda morta
Imin = corrente minima di polarizzazione
Gain = guadagno di corrente



D.B. = banda morta
Imin = corrente minima di polarizzazione
Gain = guadagno di corrente

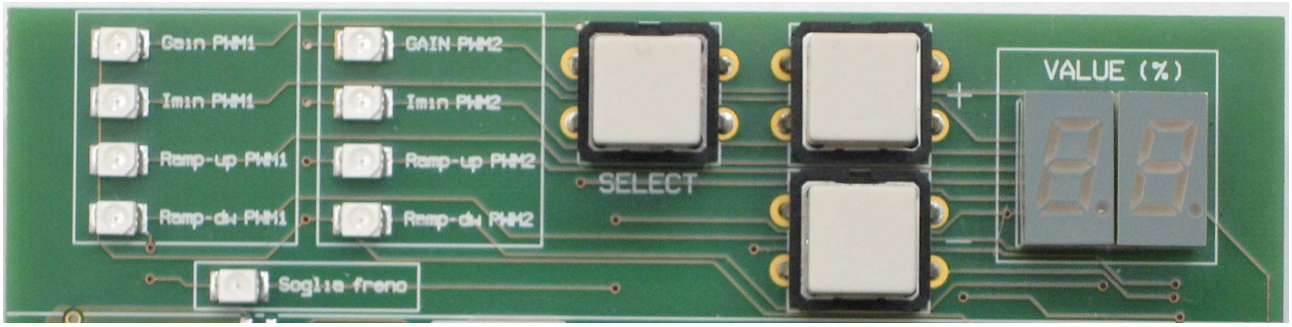
in this mode, both proportional outputs can be active at the same time.

In both symmetrical or independent operating modes of the proportional outputs, the operating logic of the control of the brake is always the same. The settings panel is used to set the threshold for the current (SF), so the brake release output is off when the current on both proportional outputs falls below the set threshold (SF). It is sufficient for the current of one of the proportional outputs to exceed the set threshold (SF) for the brake release control output to be activated.



D.B. = banda morta
Imin = corrente minima di polarizzazione
Gain = guadagno di corrente
S.F. = soglia di sblocco freno

7. Settings panel on the card



Parameter adjustment is accessed via the panel located on the card.
Press the SELECT button to scroll and select the 9 adjustable parameters in sequence. The lit LED indicates the selected parameter and the value of the parameter is shown on the display. Use the + (plus) key to increase the value of the selected parameter; use the – (minus) key to decrease the value of the selected parameter. Press P1 again to save the setting and access the next parameter.
The settings are saved automatically when the card is switched off.

Table of card parameter settings calibrated for 0.88Ampere Solenoids					
	Setting range indicated on the display		Correspondence between the indicated setting range and the controlled physical magnitude		
	min. setting	max. setting	Minimum	Maximum	
PWM1 gain	00	99	00 = 0.50A	99 = 1.0A	
PWM1 Imin	00	99	00 = 0.0A	99 = 0.50A	
PWM1 ramp up	00	99	00 = 0.0 sec	99 = 20 sec	
PWM1 ramp dw	00	99	00 = 0.0 sec	99 = 20 sec	
PWM2 gain	00	99	00 = 0.50A	99 = 1.0A	
PWM2 Imin	00	99	00 = 0.0A	99 = 0.50A	
PWM2 ramp up	00	99	00 = 0.0 sec	99 = 20 sec	
PWM2 ramp dw	00	99	00 = 0.0 sec	99 = 20 sec	
Brake threshold	00	99	00 = 0.0A	99 = 0.50A	

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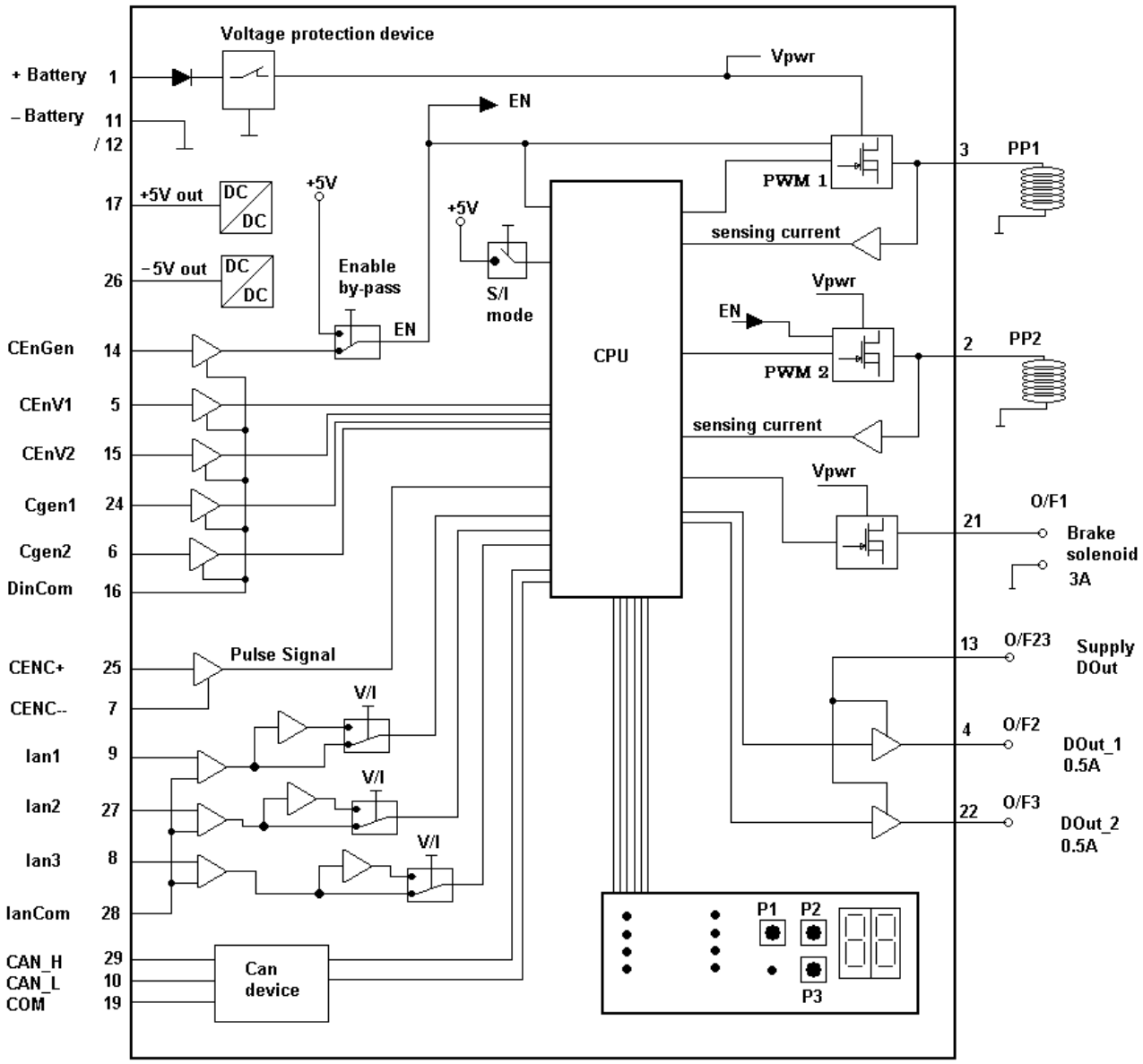
Table of card parameter settings calibrated for 1.76Ampere Solenoids				
	Setting range indicated on the display		Correspondence between the indicated setting range and the controlled physical magnitude	
	min. setting	max. setting	Minimum	Maximum
PWM1 gain	00	99	00 = 0.90A	99 = 1.8A
PWM1 Imin	00	99	00 = 0.0A	99 = 0.90A
PWM1 ramp up	00	99	00 = 0.0 sec	99 = 20 sec
PWM1 ramp dw	00	99	00 = 0.0 sec	99 = 20 sec
PWM2 gain	00	99	00 = 0.90A	99 = 1.8A
PWM2 Imin	00	99	00 = 0.0A	99 = 0.90A
PWM2 ramp up	00	99	00 = 0.0 sec	99 = 20 sec
PWM2 ramp dw	00	99	00 = 0.0 sec	99 = 20 sec
Brake threshold	00	99	00 = 0.0A	99 = 0.90A

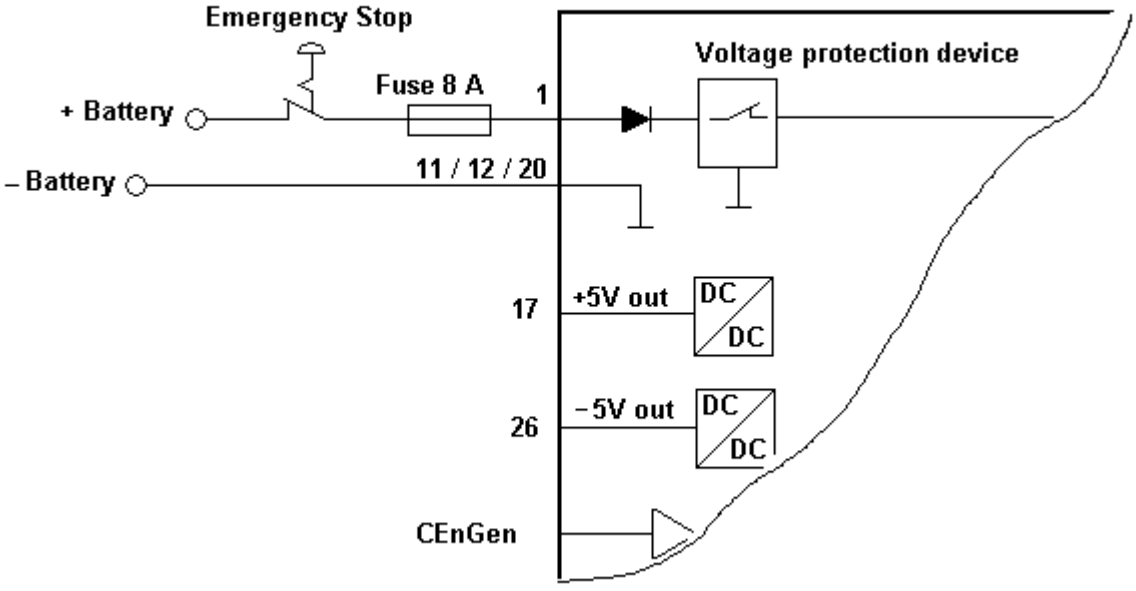
Table of card parameter settings calibrated for 2.50Ampere Solenoids				
	Setting range indicated on the display		Correspondence between the indicated setting range and the controlled physical magnitude	
	min. setting	max. setting	Minimum	Maximum
PWM1 gain	00	99	00 = 1.50A	99 = 3.0A
PWM1 Imin	00	99	00 = 0.0A	99 = 1.50A
PWM1 ramp up	00	99	00 = 0.0 sec	99 = 20 sec
PWM1 ramp dw	00	99	00 = 0.0 sec	99 = 20 sec
PWM2 gain	00	99	00 = 1.50A	99 = 3.0A
PWM2 Imin	00	99	00 = 0.0A	99 = 1.50A
PWM2 ramp up	00	99	00 = 0.0 sec	99 = 20 sec
PWM2 ramp dw	00	99	00 = 0.0 sec	99 = 20 sec
Brake threshold	00	99	00 = 0.0A	99 = 1.50A

8. Block diagram



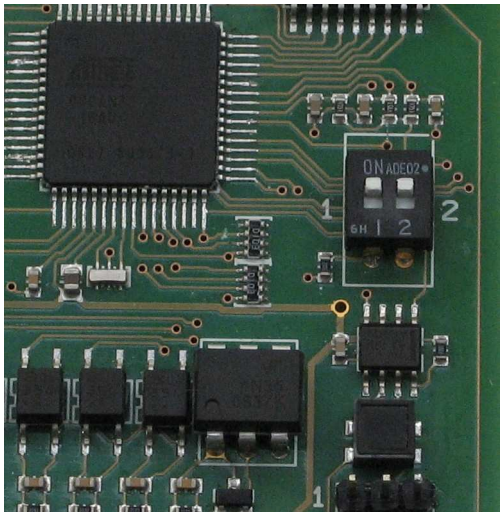
9. General power supply

The card is supplied with V DC continuous voltage.
If the coils connected to the card are 24V DC, the card should be supplied with 24V DC.
If the coils connected to the card are 12V DC, the card should be supplied with 12V DC.
If the card is supplied with 12V DC, the section of the general power supply wires for the card and for the power supply to the coils should not be less than 1.5mm^2.
If the card is supplied with 24V DC, the section of the general power supply wires for the card and for the power supply to the coils should not be less than 1.0mm^2.
The general supply to the card must be protected by means of an external 8A fuse.



CenGen bypass switch for the general enabling control of the card.

Switch to select operation of the PWM outputs in parallel mode (**independent**) or alternating mode (**symmetrical**).

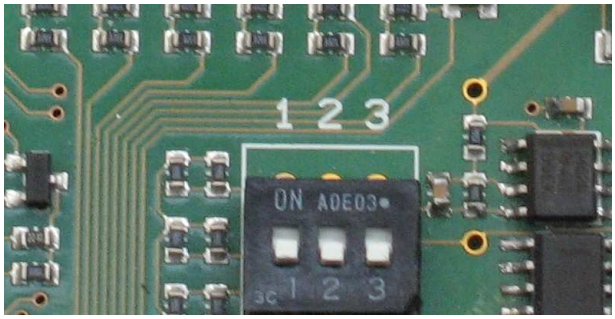


The status of the CenGen general enabling control of the card can be forced by putting switch 2 in the ON position.

Select parallel (or independent) operating mode of the PWM outputs by putting switch 1 in the ON position.

Select alternating (or symmetrical) operating mode of the PWM outputs by putting switch 1 in the OFF position.

Switch to select the analogue inputs Ian1, Ian2, Ian3 with ± 5V voltage or ± 20mA current.

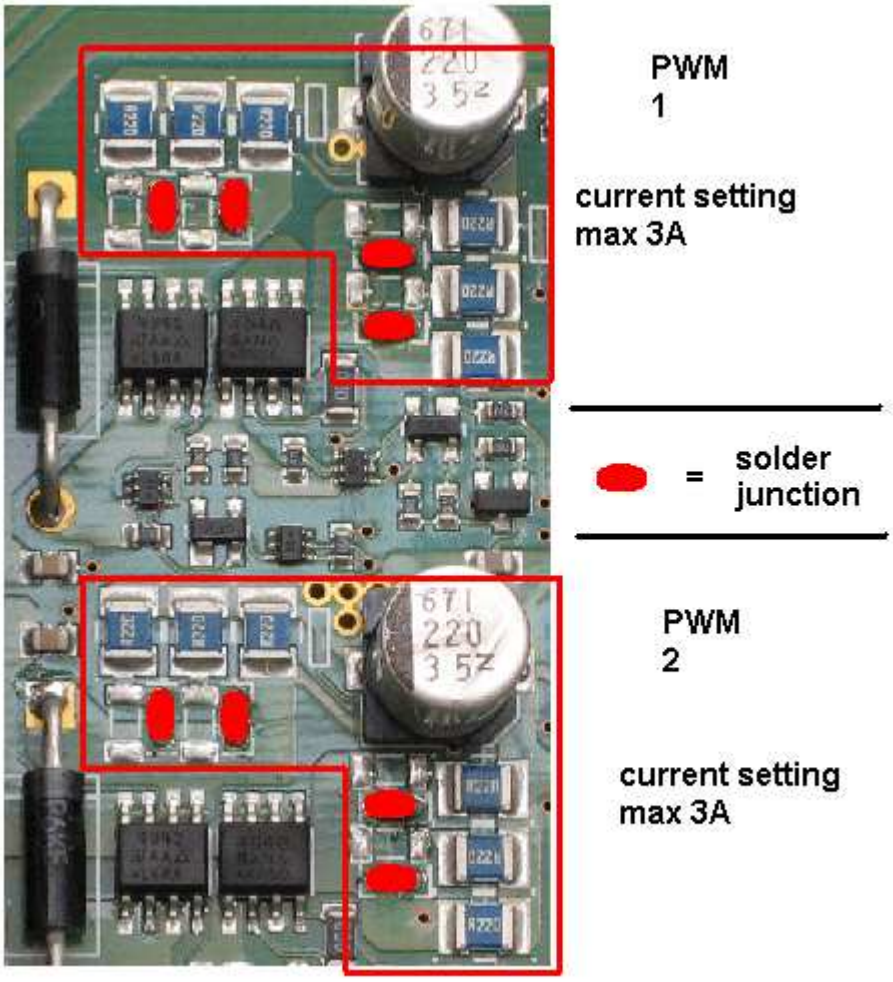


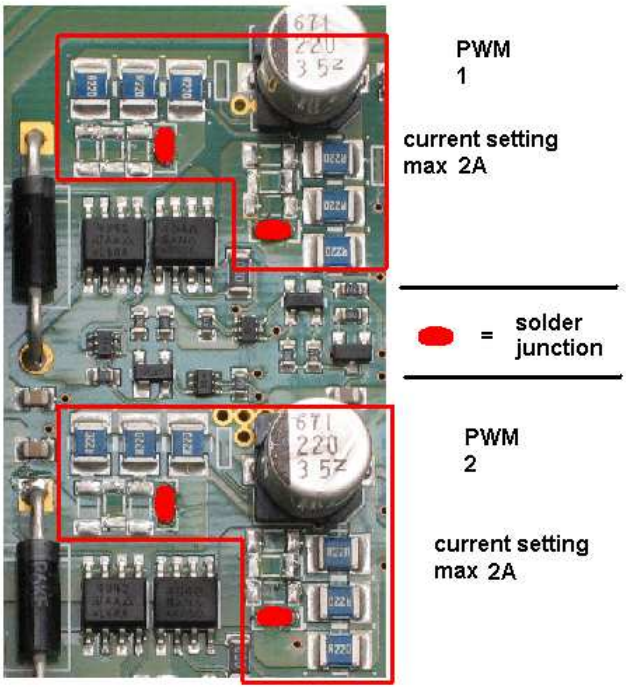
Put the switches shown opposite in the OFF position to select voltage analogue inputs.
Switch 1 = Ian1
Switch 2 = Ian2
Switch 3 = Ian3

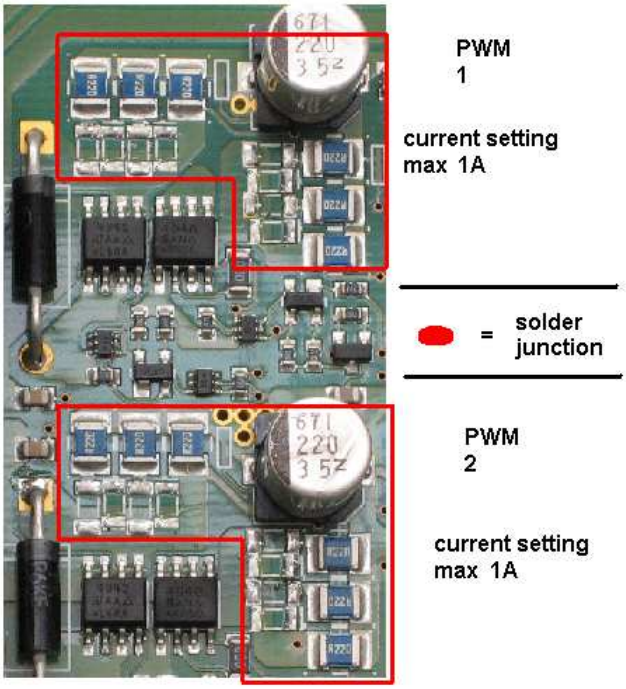
Put the switches shown opposite in the ON position to select current analogue inputs.
Switch 1 = Ian1
Switch 2 = Ian2
Switch 3 = Ian3

Setting the current on the PWM outputs.

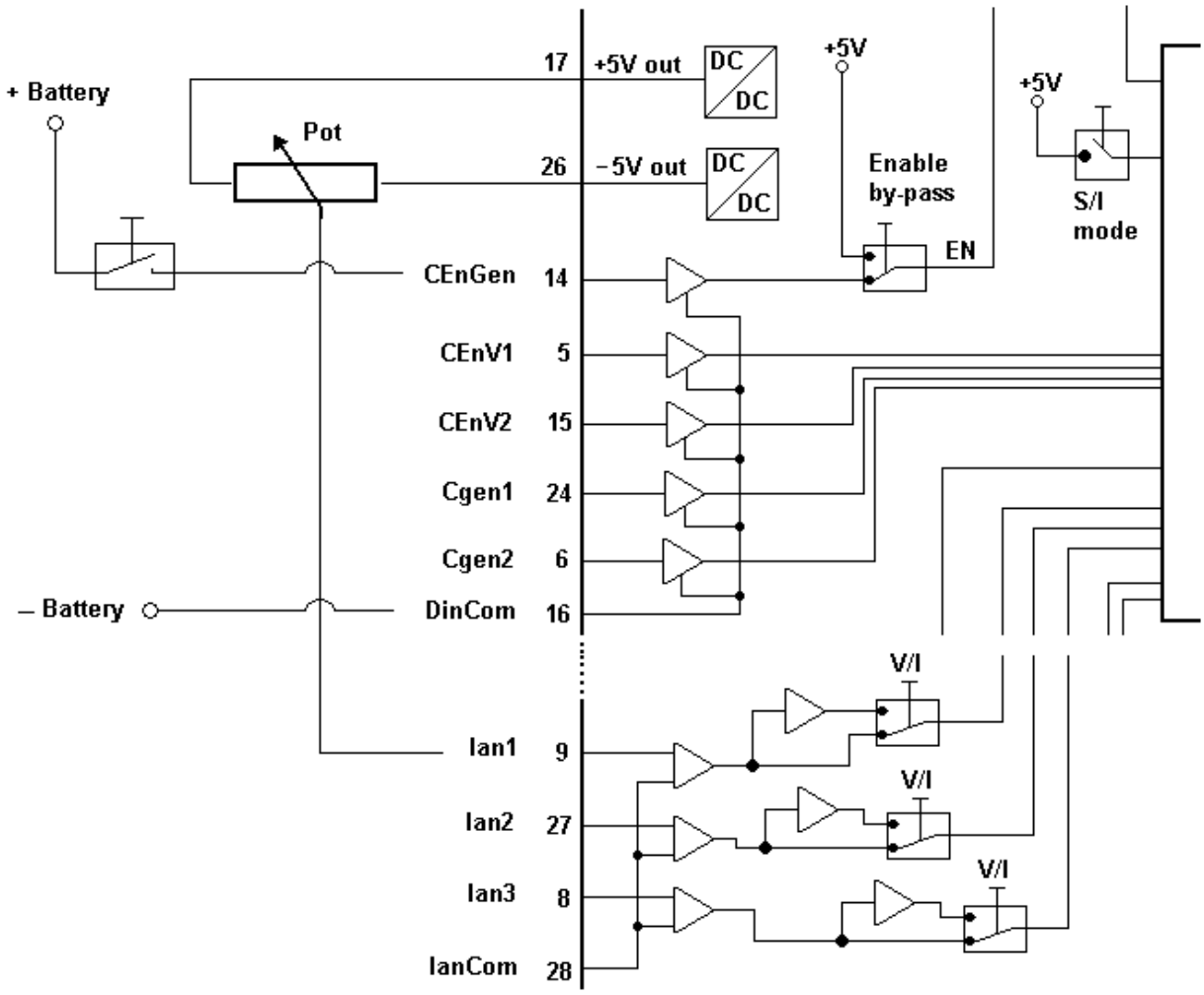
3 different levels of maximum current supplied to the PWM outputs can be set by placing appropriate solder joints; the current setting is independent for the two exits.







10. Connection for standard alternating operation (**symmetrical**) and general card enabling (SVP_SE1ST00D1).



in this configuration, the control signal varies between –5V and +5V with 0V as the central value; the control signal must be on analogue input **Ian 1**.
Any control signals sent to the card's analogue input **Ian 2** will be ignored.
In symmetrical mode, when the reference signal is between 0V and –5V, proportional output **PP1** is off but proportional output **PP2** is on. When the reference signal is between 0V and +5V, proportional output **PP1** is on but proportional output **PP2** is off.

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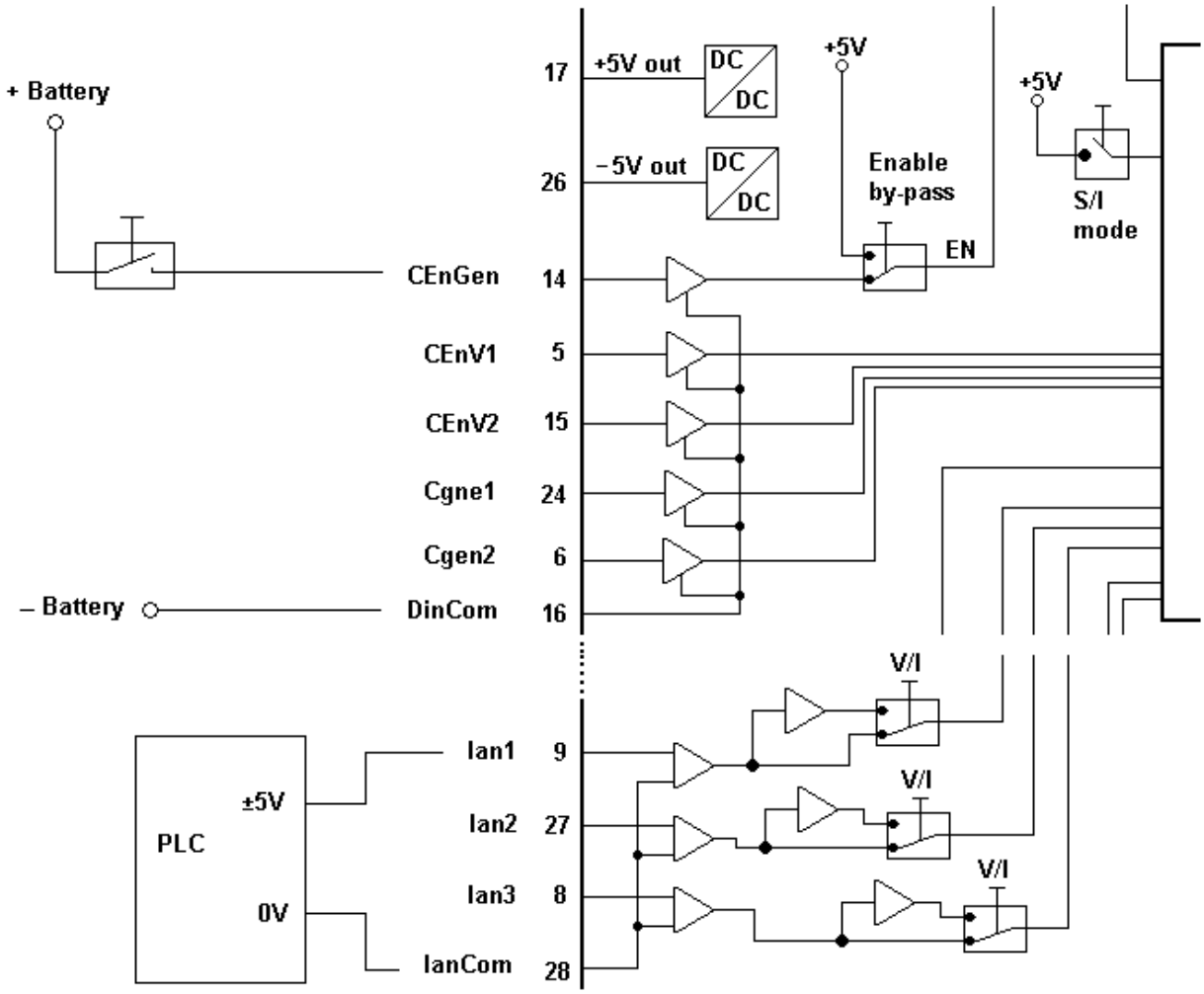
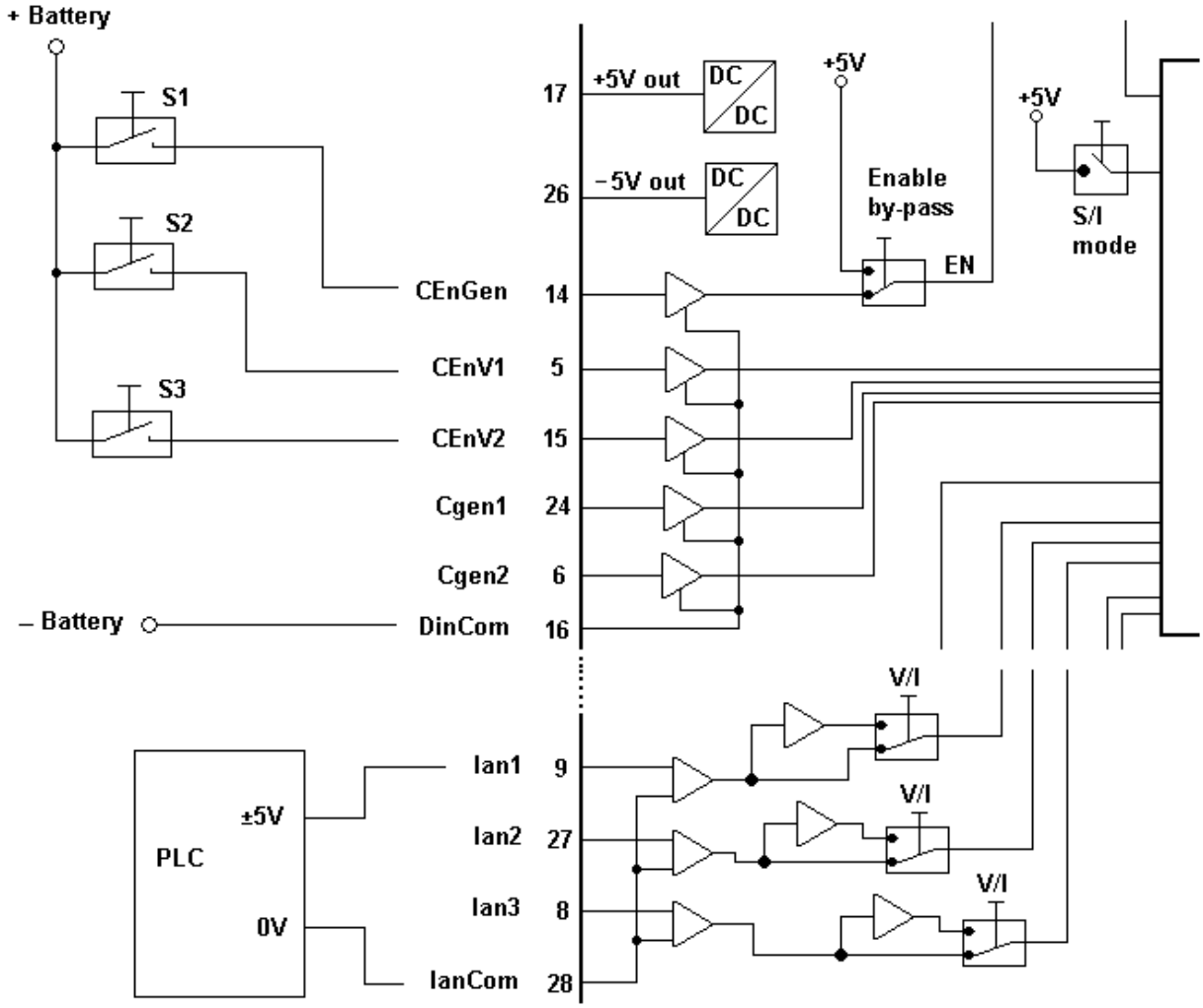
Standard alternating operation (**symmetrical**) with signal from external source and general card enabling (SVP_SE1ST00D1).

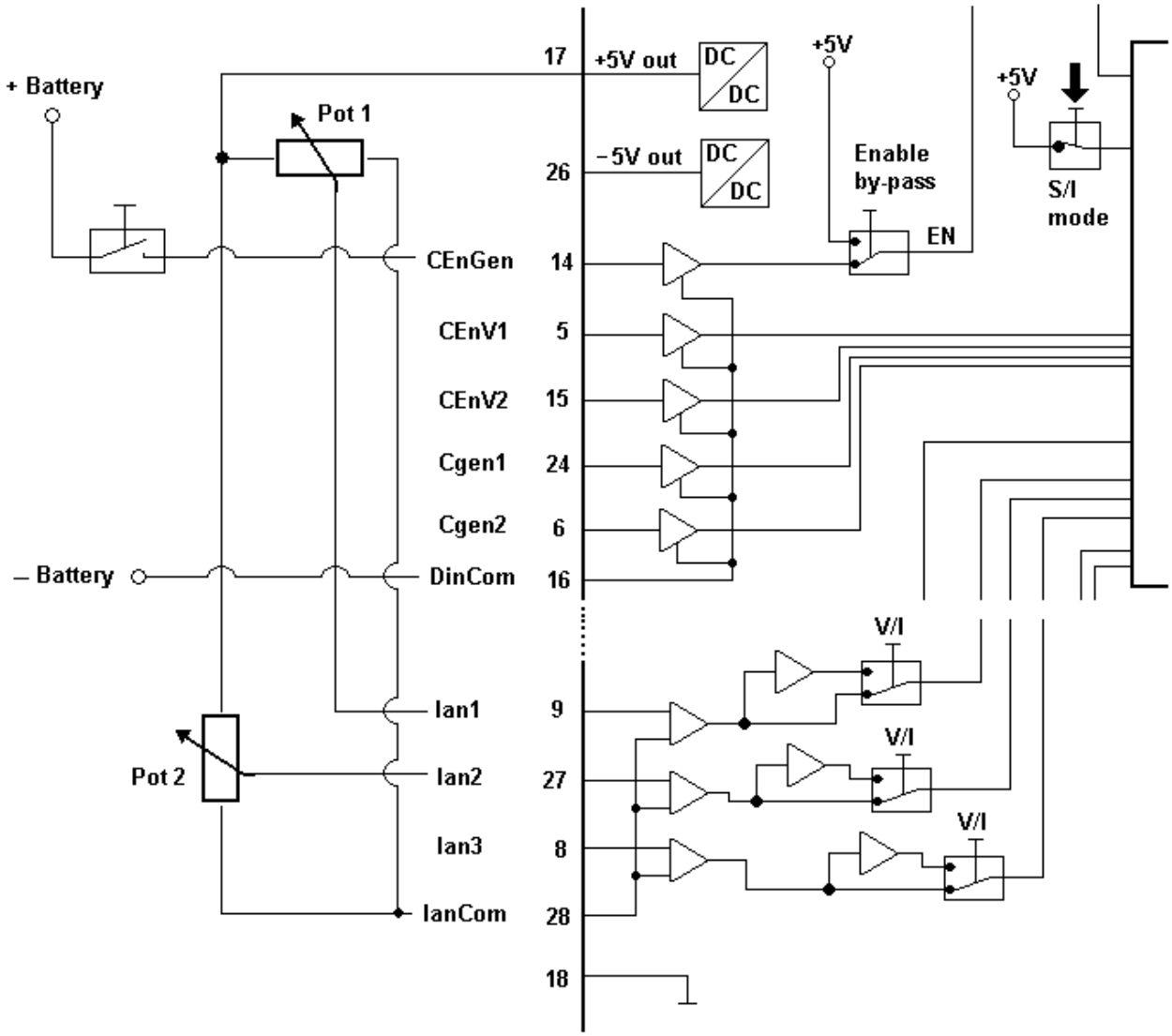


Standard alternating operation (**Symmetrical**) with signal from external source, general card enabling and control of consensus for enabling the proportional output in question (SVP_**SK**1ST00D1).



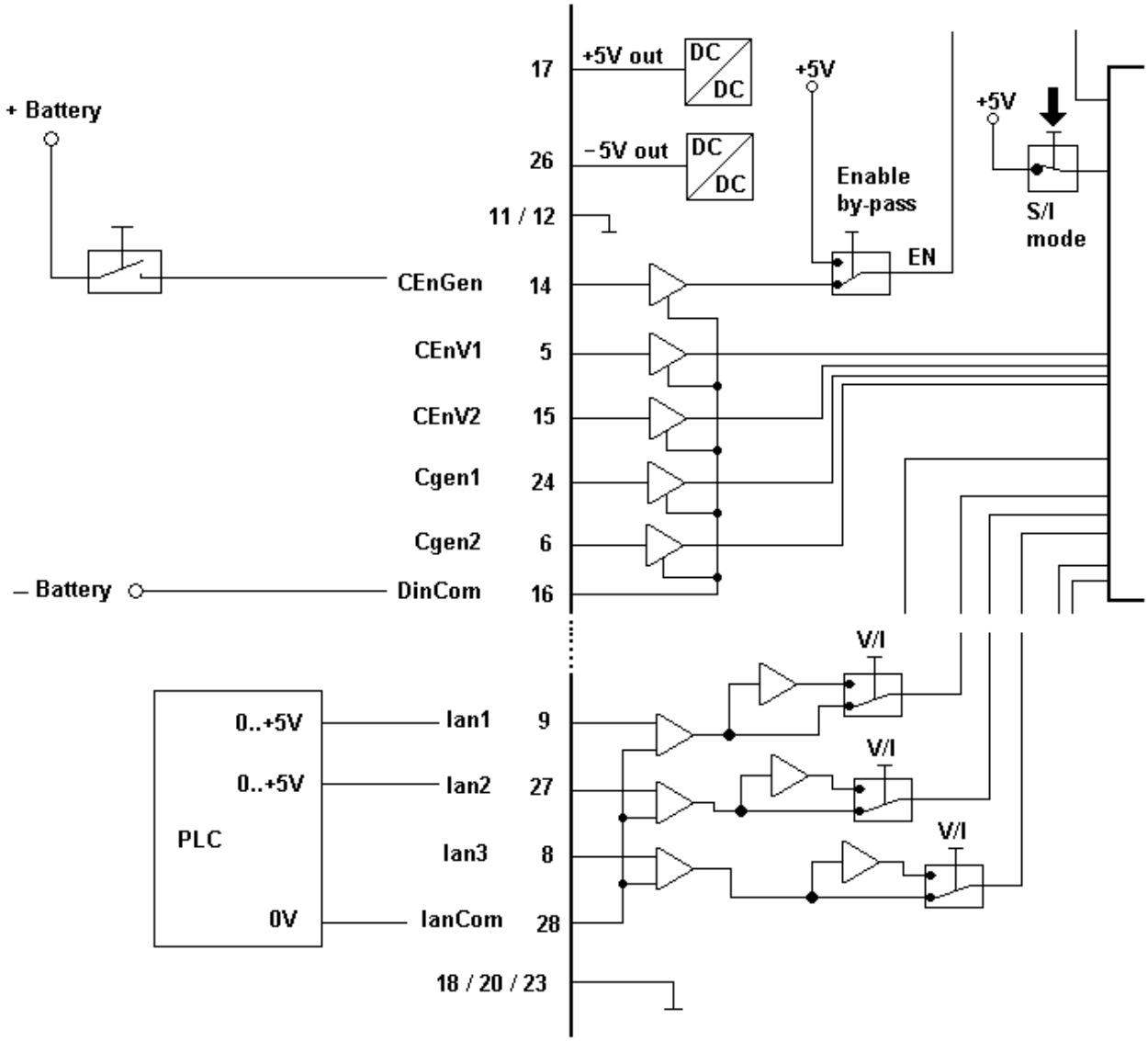
The CEnV1 (to enable proportional output PP1) and CEnV2 controls (to enable proportional output PP2) can be used as limit signals. If the combination of the SPV card + hydraulic unit are used to operate a transfer system, switches S2 and S3 can be associated with the limits and any unauthorised motion will stop in this way, but the opposite return movement will be allowed.

11. Connection for standard parallel operation (**Independent**) and general control of card enabling (SVP_**I**E1ST00D1).

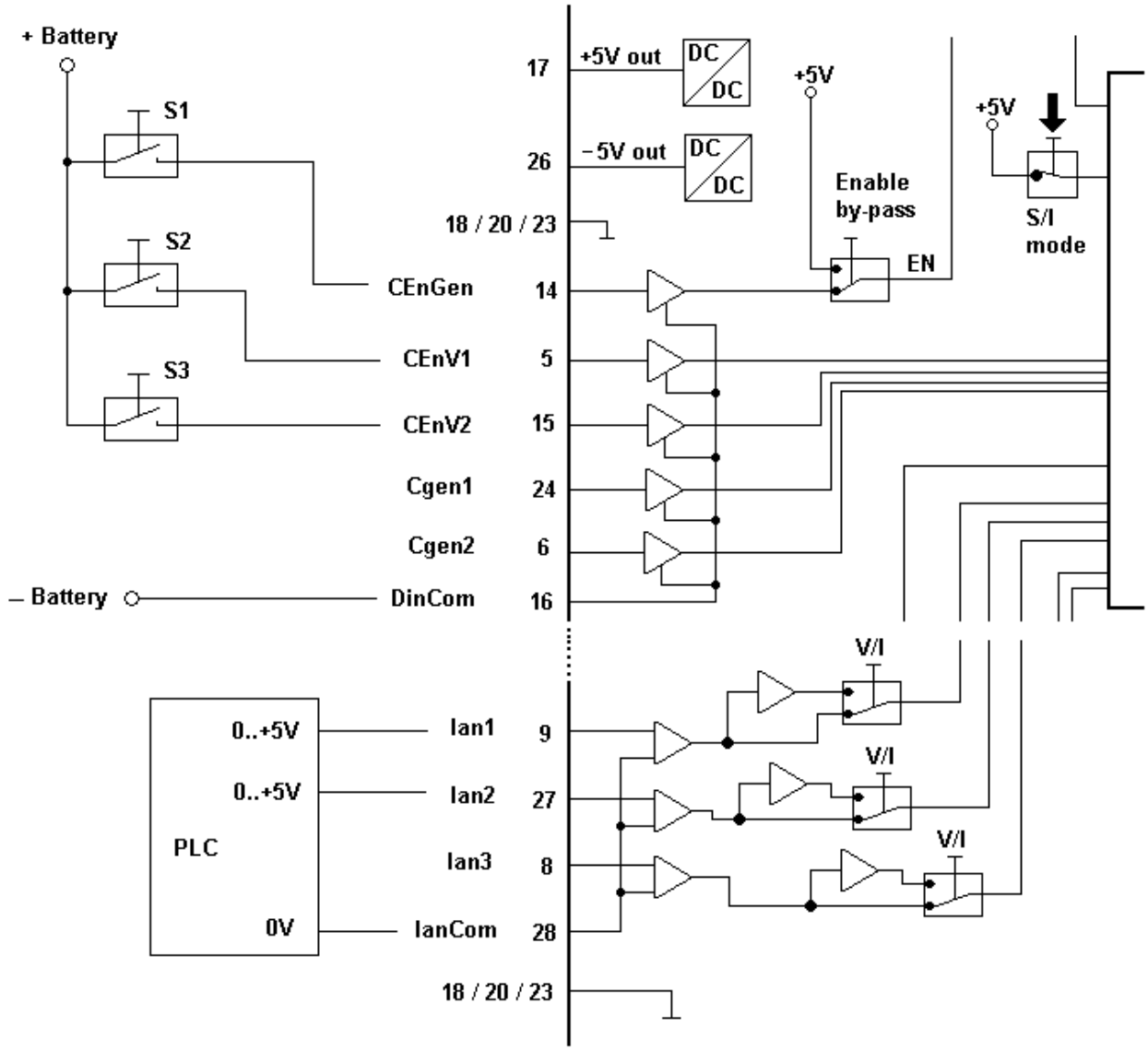


In this mode, the two proportional outputs PP1 and PP2 work independently. Proportional output PP1 is controlled by the signal on analogue input Ian PP1; proportional output PP2 is controlled by the signal on analogue input Ian 2.

Standard parallel operation (**Independent**) with signal from external source (SVP_**I**E1ST00D1) and general control of card enabling.

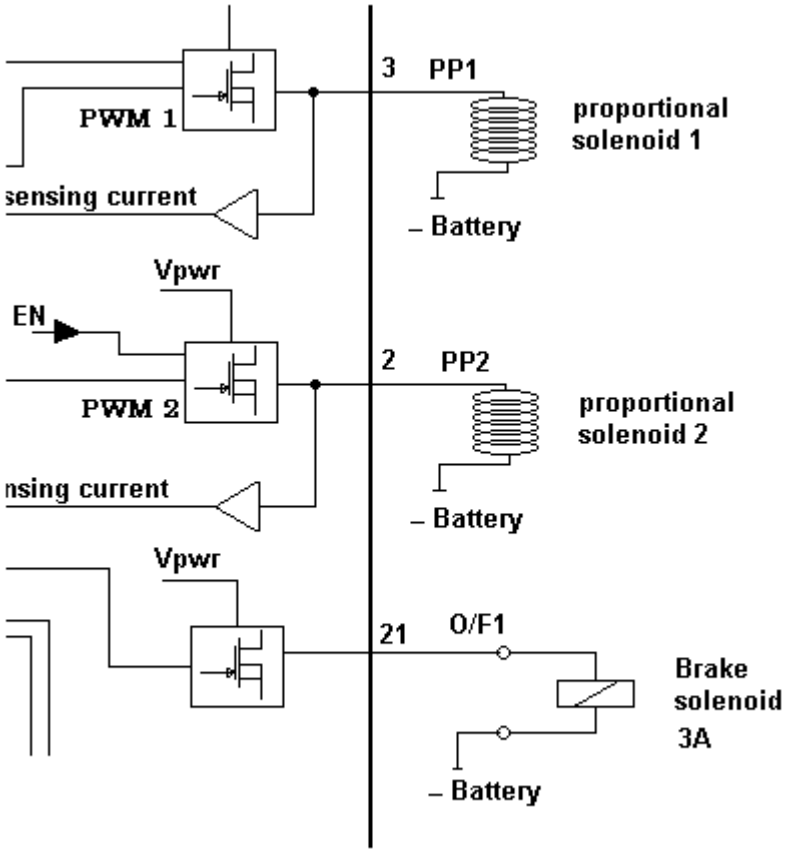


Standard parallel operation (**Independent**) with signal from external source, general card enabling and control of consensus for enabling the proportional output in question (SVP_**IK**1ST00D1).



The CEnV1 (to enable proportional output PP1) and CEnV2 controls (to enable proportional output PP2) can be used as limit signals. If the combination of the SPV card + hydraulic unit are used to operate a transfer system, switches S2 and S3 can be associated with the limits and any unauthorised motion will stop in this way, but the opposite return movement will be allowed.

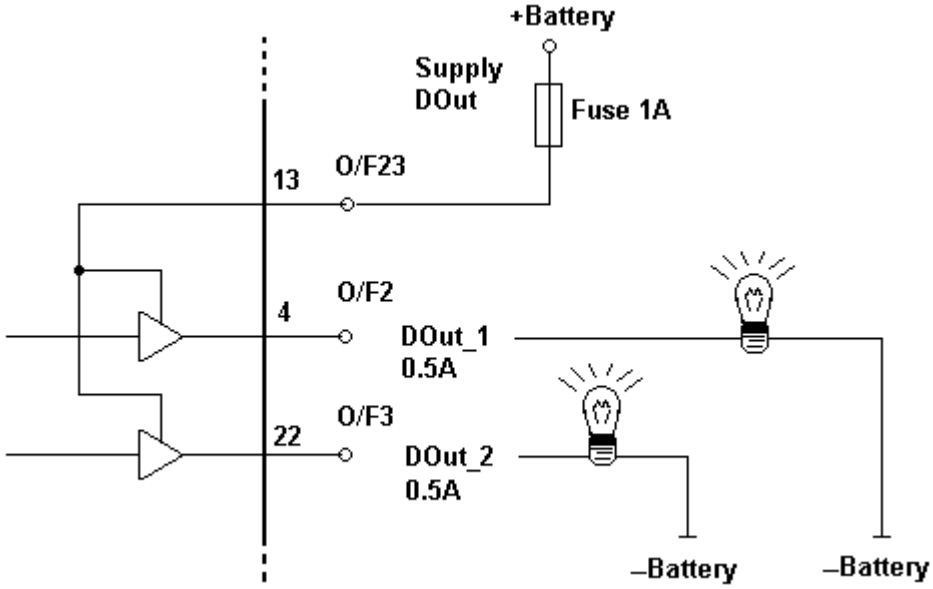
12. Connecting the proportional Solenoids and the brake control Solenoid.

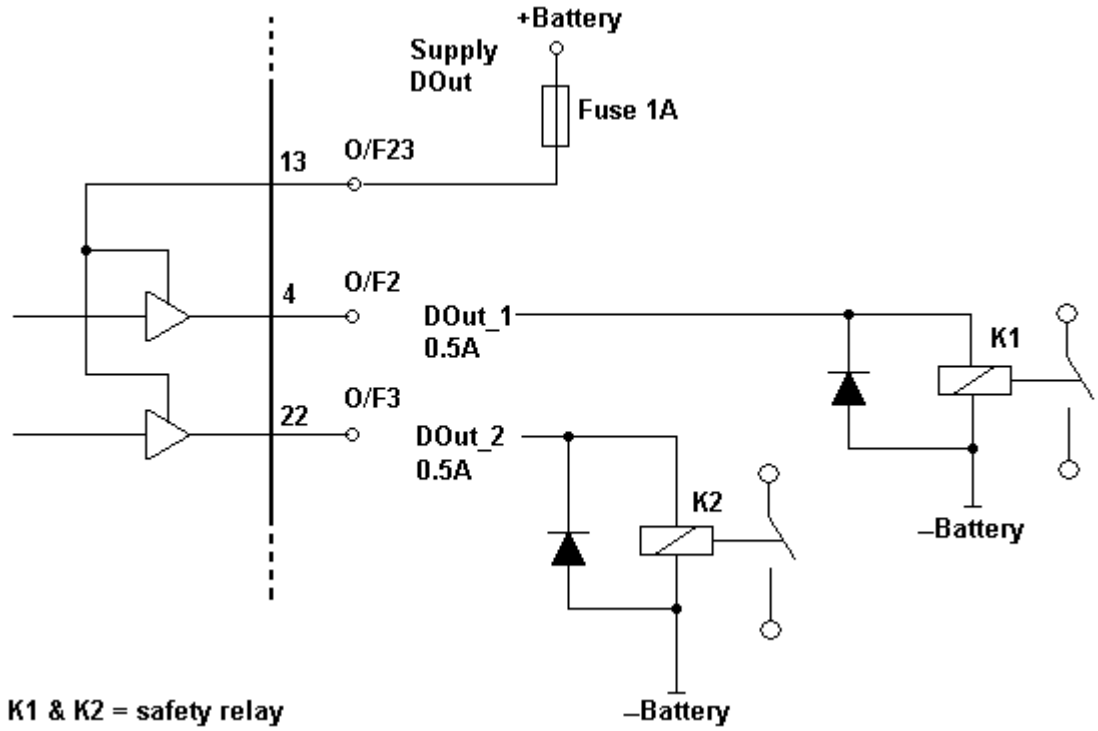


the return of the proportional Solenoids and the brake control Solenoid must be connected directly to the battery negative or the general power source.

CAUTION: a bad connection to the battery negative or the use of a wire whose section is too small does not allow for the proper setting of the proportional current to the Solenoids.
For proportional Solenoids with 1.8A current, use wire whose section is no less than 1.5mm^2. For proportional Solenoids with 0.9A current, use wire whose sections is no less than 1.0mm^2.
The wire for connecting the brake control Solenoid must have a section of no less than 1.5mm^2.

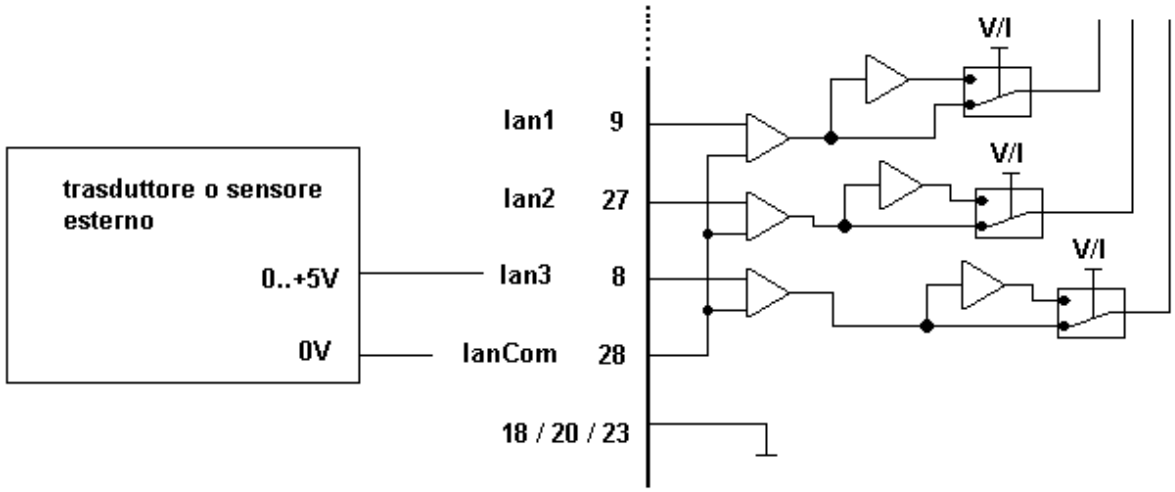
13. Connecting the signal or alarm digital outputs.



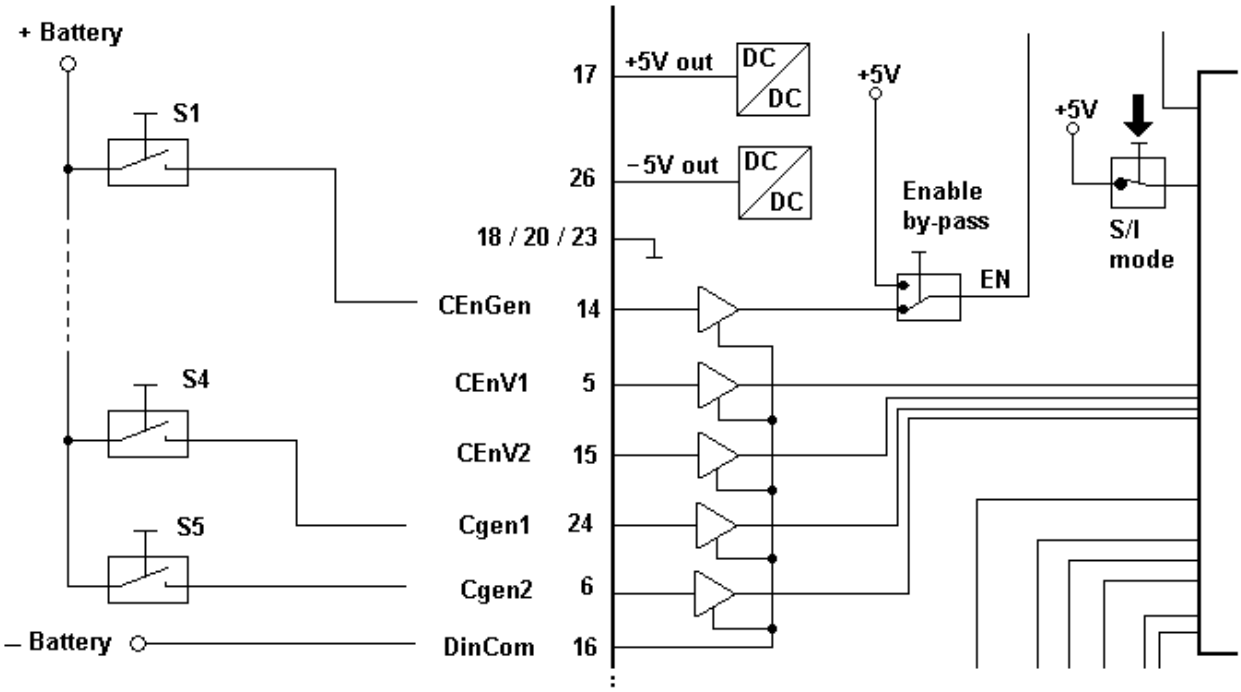


K1 & K2 = safety relay

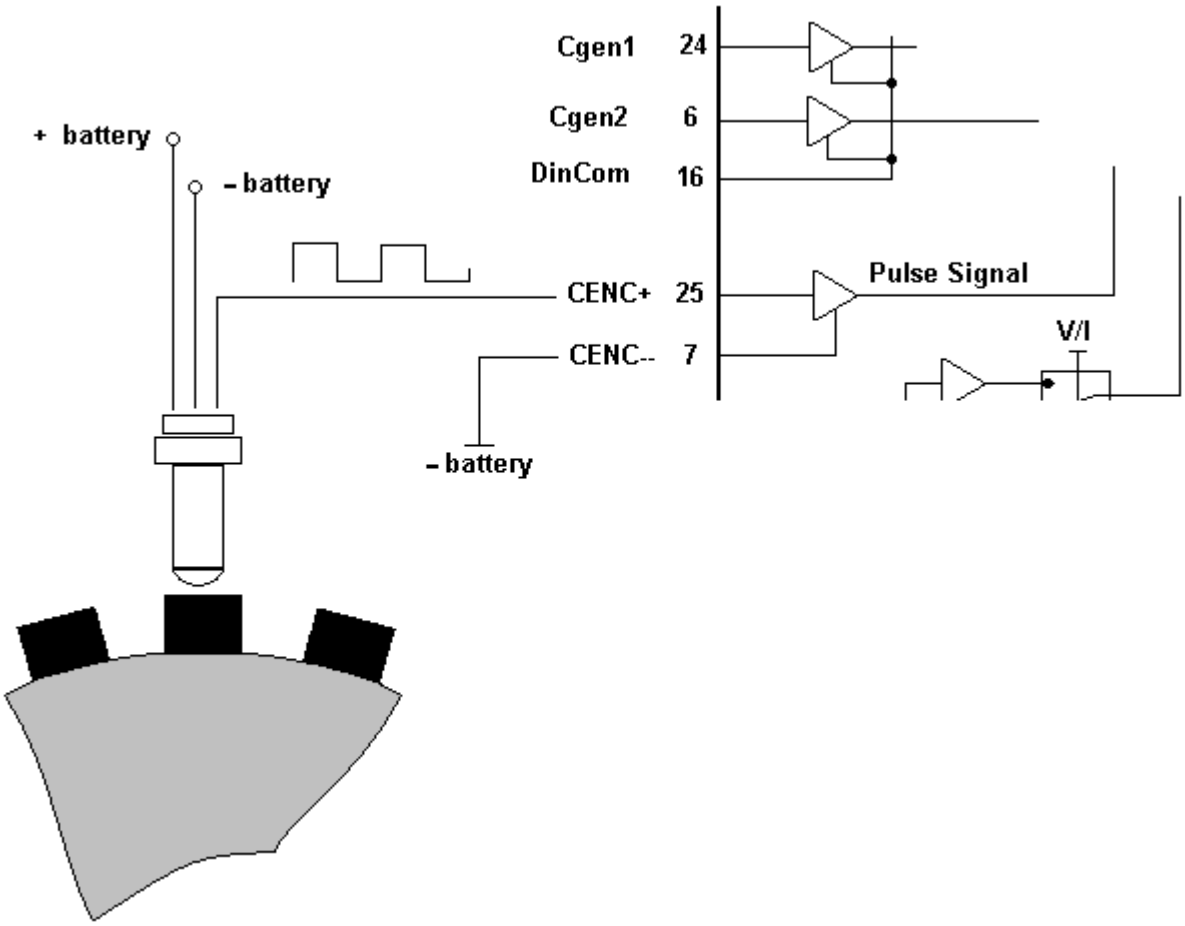
14. connection of third analogue input **Ian3** for general external signals, from position or pressure transducers.



15. connection of general digital controls Cgen1 and Cgen2, for example from external limit switches, pressure switches, minimum level sensors or thermostats.



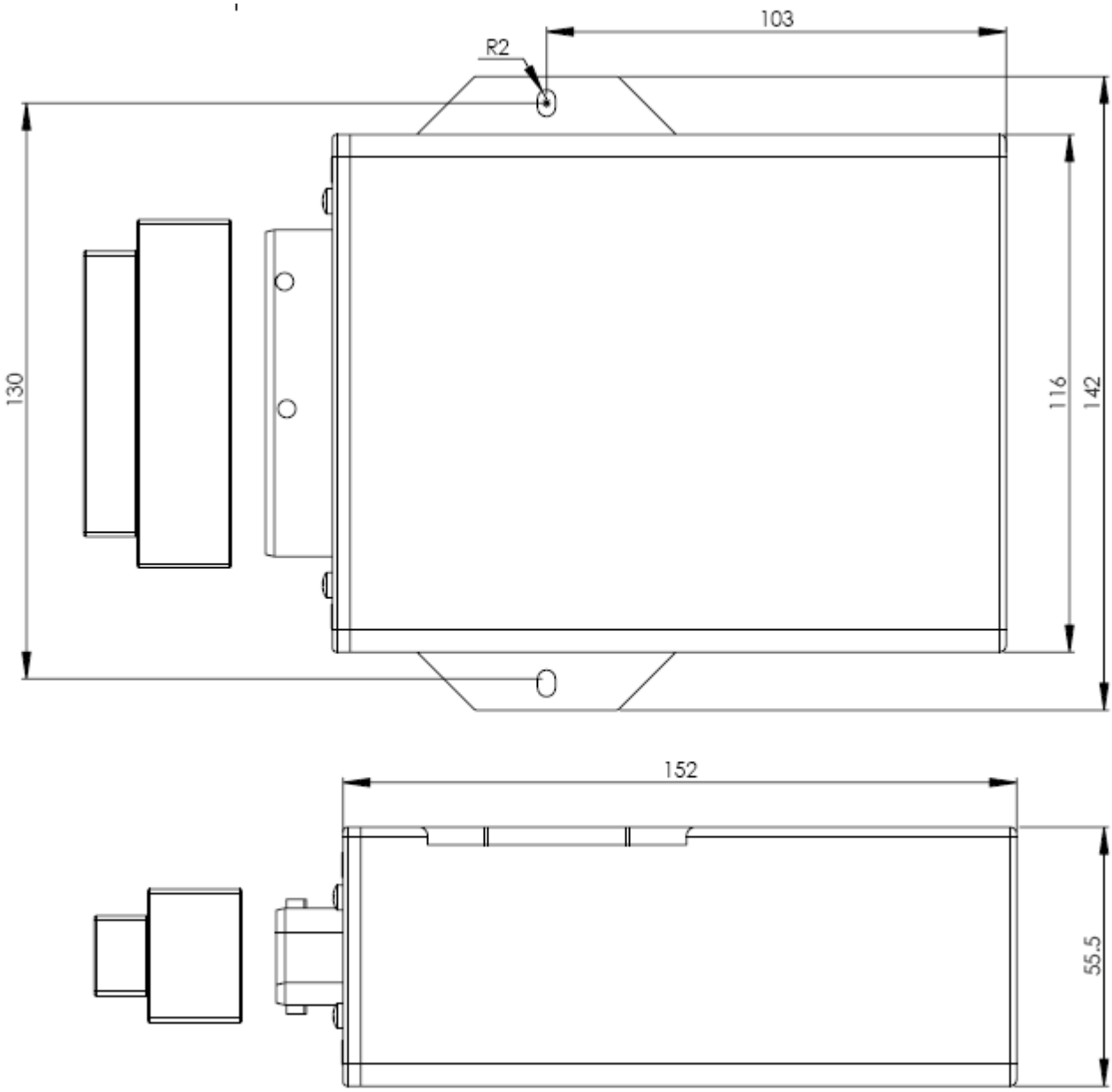
16. Connection of velocity transducer.



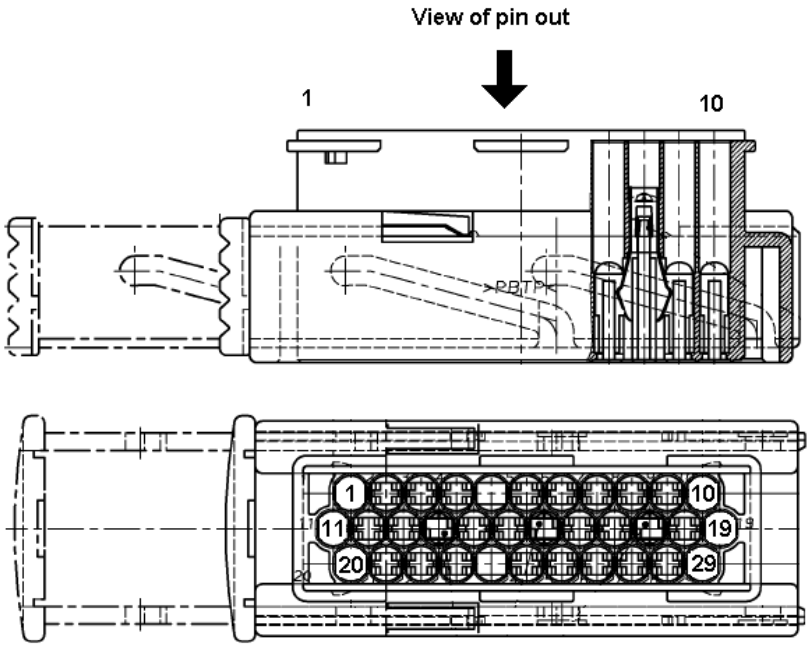
17. Connections table

Contact n.	Function	Notes
1	General power supply + BATTERY	Min 10Vdc, max 30Vdc
2	Proportional output 2 (PP2)	See diagram in section 12
3	Proportional output 1 (PP1)	See diagram in section 12
4	On/off signal output (O/F 2)	Max current 0.5A
5	Input for enabling PP1 (CEnV1)	Active high
6	Input for general digital control 2 (Cgen2)	Active high
7	Negative return for digital signal revs sensor (CENC-)	
8	Analogue control input 3 (Ian 3)	0..5V or 0..20mA
9	Analogue control input 1 (Ian 1)	0..5V or 0..20mA / -5V...+5V or –20mA...20mA
10	CAN_L	
11	0V general power supply - BATTERY	
12	0V general power supply – BATTERY	
13	Common power supply (O/F23) digital signal outputs 2 and 3	See diagram in section 13
14	Input for general card enabling (CEnGen)	Active high
15	Input for enabling PP2 (CenV2)	Active high
16	Negative return of digital controls and enabling (DinCom)	See examples of connection in sections 10 and 11 and 15
17	Regulated output voltage +5V	Potentiometer power supply
18	0V	
19	CAN_gnd	
20	0V	
21	On/off current output (O/F1) 3A brake control	See diagram in section 12
22	On/off signal output (O/F 3)	Max current 0.5A
23	0V	
24	Input for general digital control 1 (Cgen1)	Active high
25	positive input for digital signal revs sensor (CENC)	
26	Regulated output voltage -5V	Potentiometer power supply
27	Analogue control input 2 (Ian 2)	0..5V or 0..20mA
28	Common return of analogue inputs (IanCom)	See examples of connection in sections. 10 and 11 and 14
29	CAN_H	

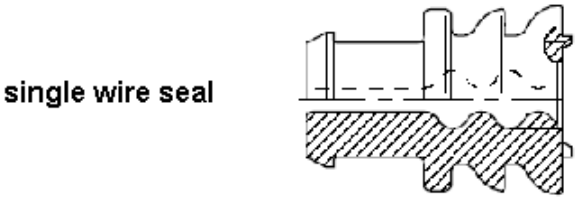
18. overall dimensions

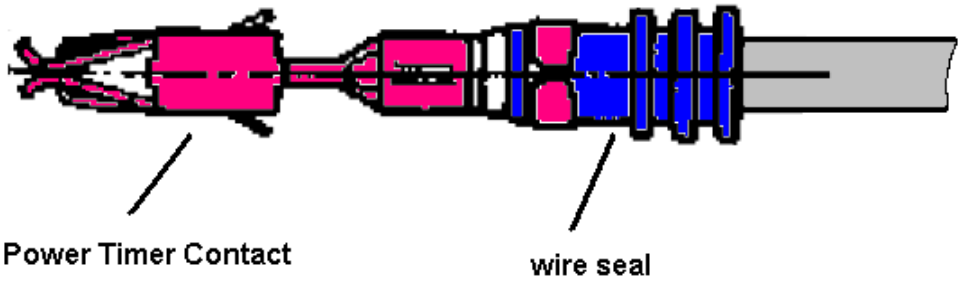


29-contact AMP connector, wiring side.



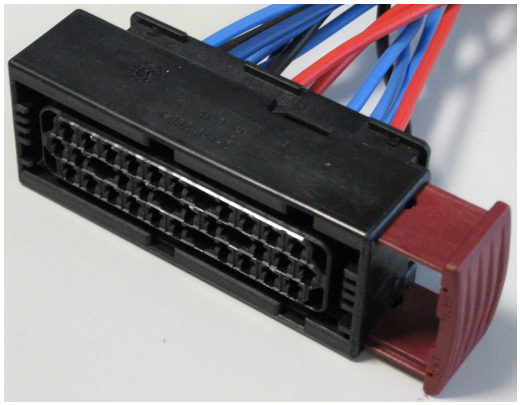
Detail of how to crimp the electrical contact and the rubber seal on the electric wire.





CAUTION: Any pins which are not connected on the wired side must be sealed with the cavity seals (red), ordered separately.

USER - MANUAL	Control Card for pumps/motors - SVP	
	Manual code :P35160013E	Revision:1

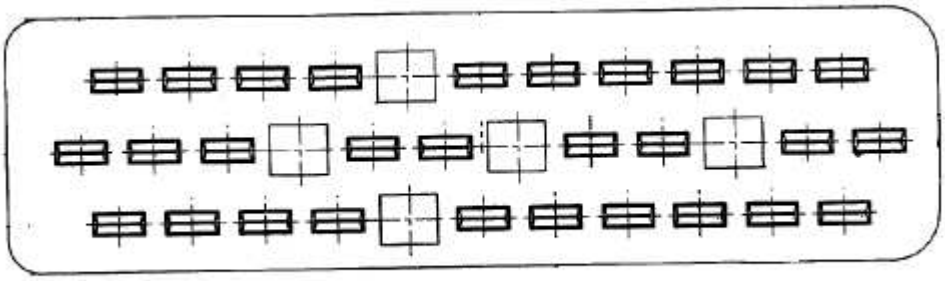


19. Spare parts kit (**single order code for the customer VE** -)

The kit includes:

Facial gasket sealing for connector (one piece)

	Aron code	AMP code
Facial Sealing	VE ----	963222-1

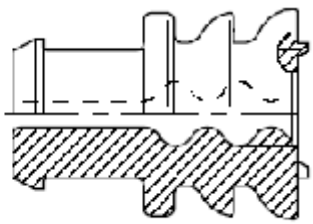


silicon facial sealing

Gasket seal for single wire (pack of 30)

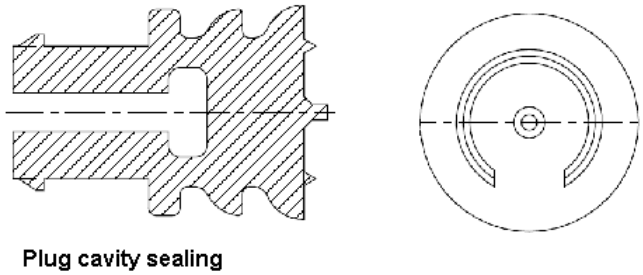
	Aron code	AMP code
Wire sealing	VE0010400	828905_1

single wire seal



Gasket to seal unused contact on loose connector, wiring side (pack of 15).

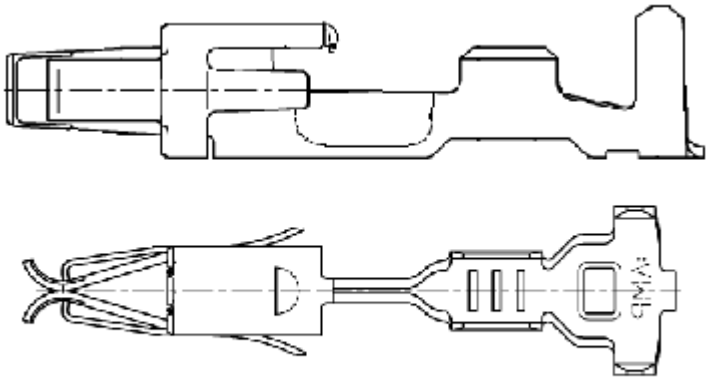
	Aron code	AMP code
Cavity sealing	VE -----	828906



Plug cavity sealing

Junior power timer contact (pack of 30).

	Aron code	AMP code
JPT crimp contact	VE0020600	929937-3 or 929938-3



JPT contact

Loose side of connector (pack of 1).

	Aron code	AMP code
Plug connector 29 pin	VE	963449-2

JPT housing connector (Plug) 29P

20. Table of operating logic for enabling.

Card Type	CenGen Status	Status CEnV1	Status CEnV2	Output PP1	Output PP2
SVP**0*ST00D1 SVP**0*CN00D1	Any X →	Any X →	Any X →	Active	Active

Proportional outputs PP1 and PP2 are always active.

Card Type	CenGen Status	Status CEnV1	Status CEnV2	Output PP1	Output PP2
SVP**E*ST00D1 SVP**E*CN00D1	Level 0V LO →	Any X →	Any X →	Inactive	Inactive
	+ Batt level HI →	Any X →	Any X →	Active	Active

Proportional outputs PP1 and PP2 are only active (i.e. supplying current) if the general enabling control CenGen is at high voltage level (+ Battery).

Card Type	CenGen Status	Status CEnV1	Status CEnV2	Output PP1	Output PP2
SVP**K*ST00D1 SVP**K*CN00D1	Level 0V LO →	Any X →	Any X →	Inactive	Inactive
	+ Batt level HI →	Level 0V LO →	Level 0V LO →	Inactive	Inactive
	+ Batt level HI →	+ Batt level HI →	+ Batt level HI →	Active	Active

Proportional output PP1 is only active (i.e. supplying current) if general enabling control (CenGen) is activated (+ Battery) and the enabling control relating to PP1 (CEnV1) is activated (+ Battery).
Proportional output PP2 is only active (i.e. supplying current) if general enabling control (CenGen) is activated (+ Battery) and the enabling control relating to PP2 (CEnV2) is also activated (+ Battery).

21. Table of recommended parameters settings

Control with Solenoid	9V (special request)	12V standard	24V standard
Product code for matching SVP card	SVP**Z*****ST00D1	SVP**Y*****ST00D1	SVP**X*****ST00D1
Recommended card supply	12VDC	12VDC	24VDC

	Model : H1V					
	With EM Control					
		12V Solenoid	24V Solenoid			
PWM1 Imin		650 mA	350 mA			
PWM2 Imin		650 mA	350 mA			
PWM1 Gain		1400 mA	700 mA			
PWM2 Gain		1400 mA	700 mA			
Brake threshold		650 mA	350 mA			

	Model : H2V					
	With EM Control					
		12V Solenoid	24V Solenoid			
PWM1 Imin		650 mA	350 mA			
PWM2 Imin		650 mA	350 mA			
PWM1 gain		1400 mA	700 mA			
PWM2 gain		1400 mA	700 mA			
Brake threshold		650 mA	350 mA			

USER - MANUAL	**Control Card for pumps/motors - SVP**	
	Manual code :P35160013E	Revision:1

	Model : HCV					
	With HE Control			With HE + HI Control		
		12V Solenoid	24V Solenoid		12V Solenoid	24V Solenoid
PWM1 Imin		600 mA	300 mA		600 mA	300 mA
PWM2 Imin		600 mA	300 mA		600 mA	300 mA
PWM1 gain		1500 mA	800 mA		1500 mA	800 mA
PWM2 gain		1500 mA	800 mA		1500 mA	800 mA
Brake threshold		600 mA	300 mA		600 mA	300 mA

	Model : SH6V 55 and 100					
	With HER / HEH Control			With HEN Control		
		12V Solenoid	24V Solenoid		12V Solenoid	24V Solenoid
PWM1 Imin		400 mA	200 mA		600 mA	300 mA
PWM2 Imin		400 mA	200 mA		600 mA	300 mA
PWM1 gain		1000 mA	500 mA		1100 mA	600 mA
PWM2 gain		1000 mA	500 mA		1100 mA	600 mA
Brake threshold		400 mA	200 mA		600 mA	300 mA

	Model : SH6V 75 and 130					
	With HER / HEH Control			With HEN Control		
		12V Solenoid	24V Solenoid		12V Solenoid	24V Solenoid
PWM1 Imin		400 mA	200 mA		600 mA	300 mA
PWM2 Imin		400 mA	200 mA		600 mA	300 mA
PWM1 gain		1200 mA	600 mA		1300 mA	700 mA
PWM2 gain		1200 mA	600 mA		1300 mA	700 mA
Brake threshold		400 mA	200 mA		600 mA	300 mA

USER - MANUAL	**Control Card for pumps/motors - SVP**	
	Manual code :P35160013E	Revision:1

	Model : MD10V 21/28					
	With HER Control					
		12V Solenoid	24V Solenoid			
PWM1 Imin		400 mA	200 mA			
PWM2 Imin		400 mA	200 mA			
PWM1 gain		1000 mA	500 mA			
PWM2 gain		1000 mA	500 mA			
Brake threshold		400 mA	200 mA			

	Model : MD10V 50/64					
	With HER Control					
		12V Solenoid	24V Solenoid			
PWM1 Imin		400 mA	200 mA			
PWM2 Imin		400 mA	200 mA			
PWM1 gain		1100 mA	550 mA			
PWM2 gain		1100 mA	550 mA			
Brake threshold		400 mA	200 mA			

	Model : SH7V					
	With REN Control					
		12V Solenoid	24V Solenoid			
PWM1 Imin		400 mA	200 mA			
PWM2 Imin		400 mA	200 mA			
PWM1 gain		1200 mA	600 mA			
PWM2 gain		1200 mA	600 mA			
Brake threshold		400 mA	200 mA			